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(54) **ELEVATED SUPPORT SYSTEM**

(75) Inventors: **Bulent Erel**, Roswell, GA (US); **Tareq K. Hassan**, Norcross, GA (US); **Raymond V. Pagano**, Stone Mountain, GA (US); **James L. Pfaffenberger**, Marietta, GA (US)

(73) Assignee: **Videolarm, Inc.**, Decatur, GA (US)

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(51) **Int. Cl.**
B66D 1/50 (2006.01)

(52) **U.S. Cl.** **254/273**; 254/271; 254/282; 254/334; 254/335; 254/336; 254/338; 248/205.1

(58) **Field of Classification Search** 254/271, 254/272, 273, 274, 275, 276, 334, 335, 336, 254/337, 338; 248/205.1
See application file for complete search history.

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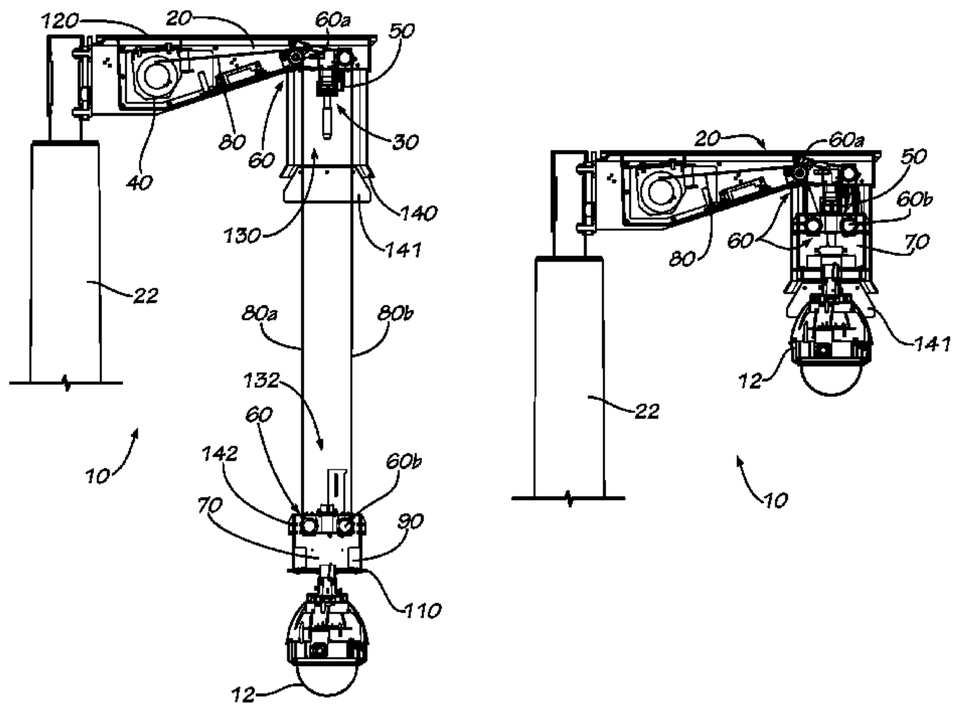
Primary Examiner — Emmanuel M Marcelo
(74) *Attorney, Agent, or Firm* — Gardner Gross Greenwald & Villanueva, PC

(57) **ABSTRACT**

A system for raising and lowering equipment and including a fixed support arm for attachment to an elevated support structure, a movable carriage for carrying the equipment, a cable extending between the fixed support arm and the movable carriage, and a winch for spooling and unspooling the cable to raise and lower the movable carriage relative to the fixed support arm. A locking mechanism secures the carriage in its raised position, and alignment guides position the carriage to make electrical connections as the carriage is engaged onto the support arm.

19 Claims, 10 Drawing Sheets



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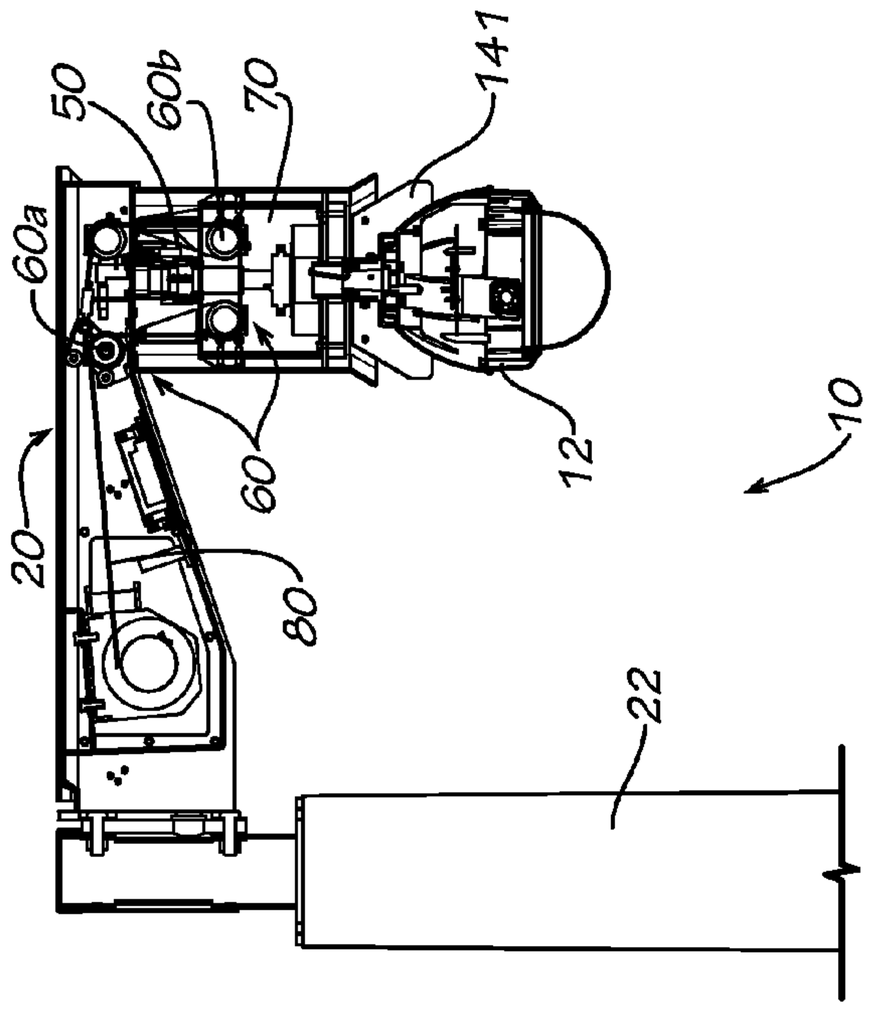
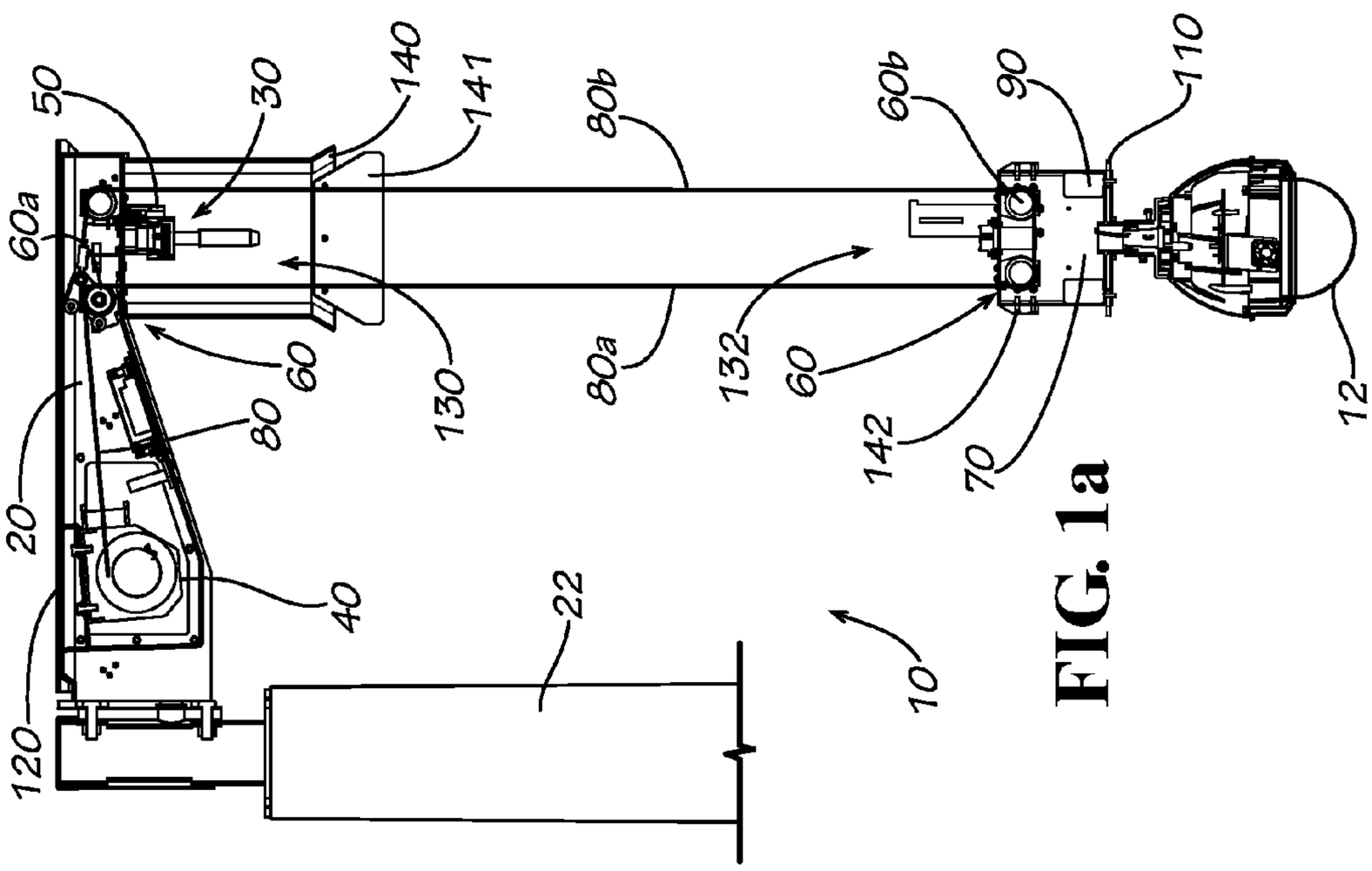

50
60b
70
141
60a
20
60
80
12
10
22

FIG. 1b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80b
60b
90
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12
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40
22
10

FIG. 1a

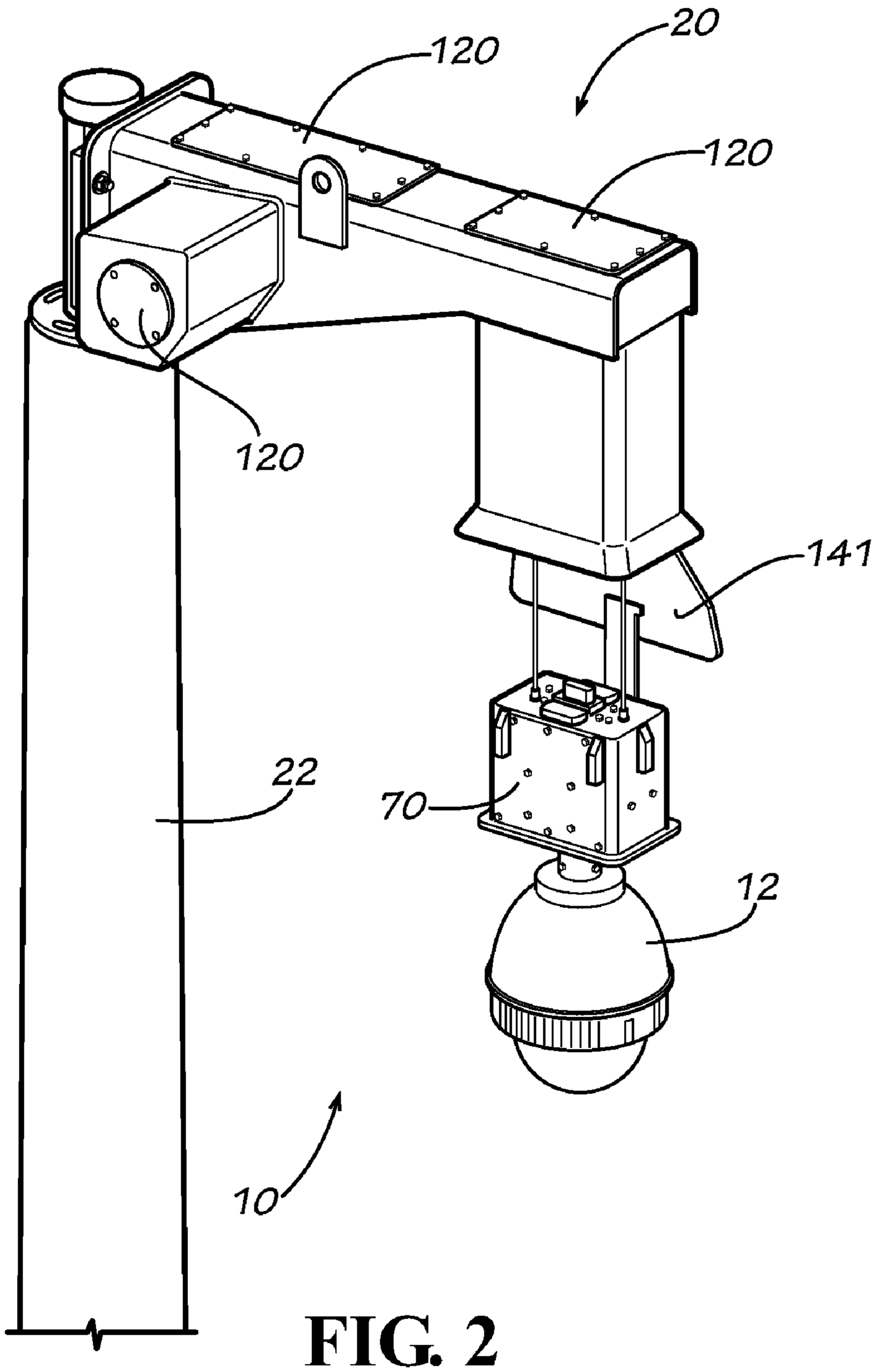

FIG. 2

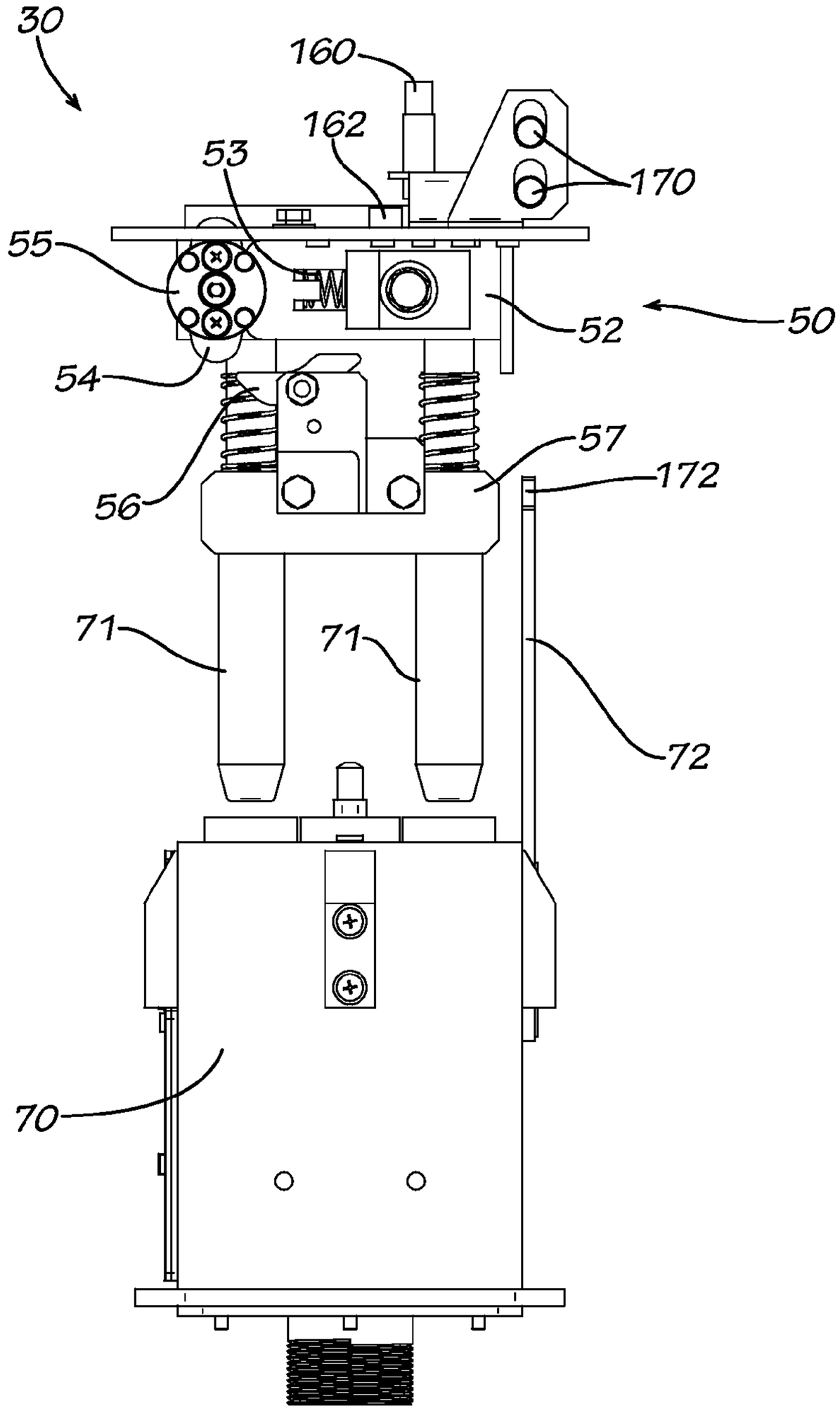

FIG. 3a

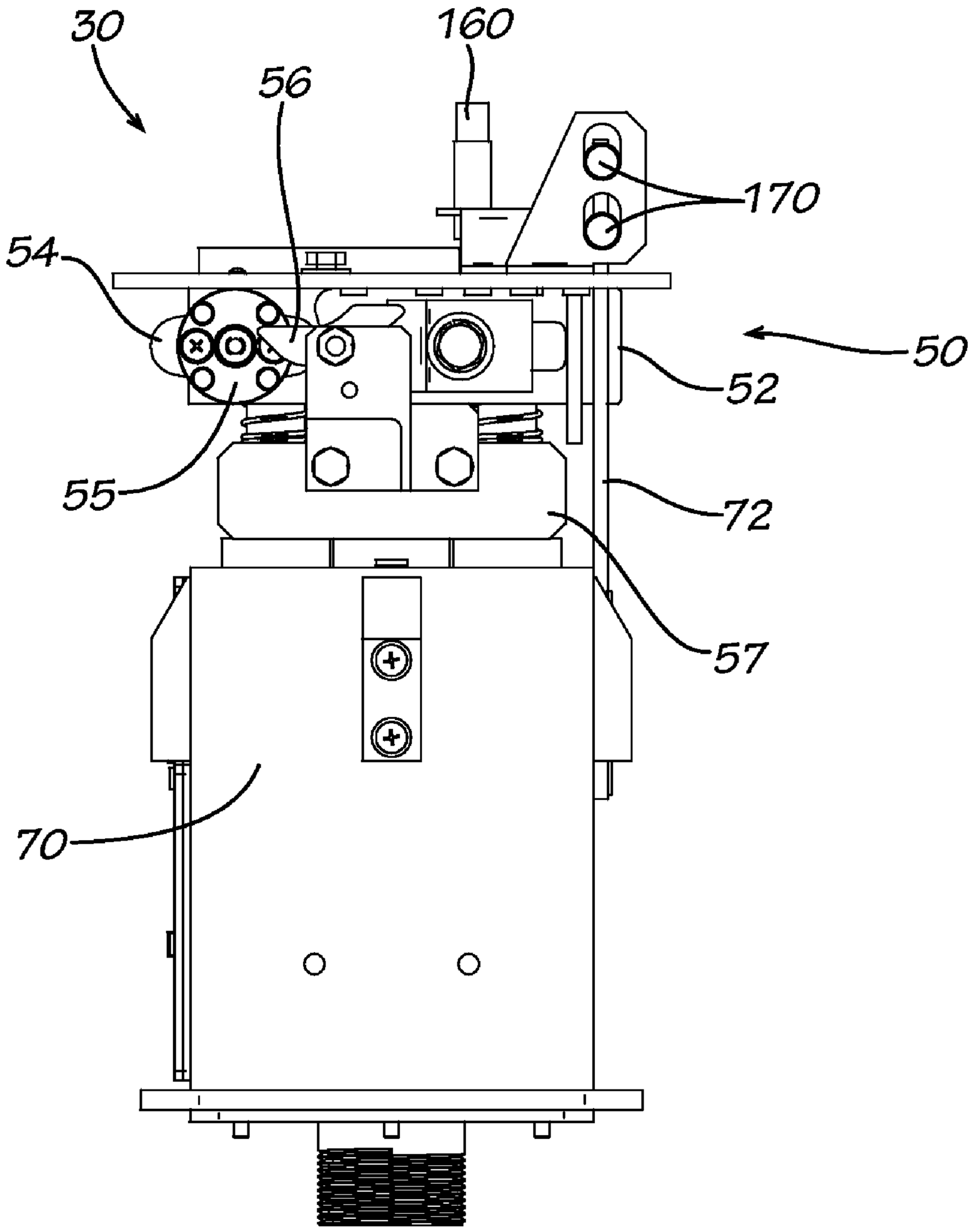

FIG. 3b

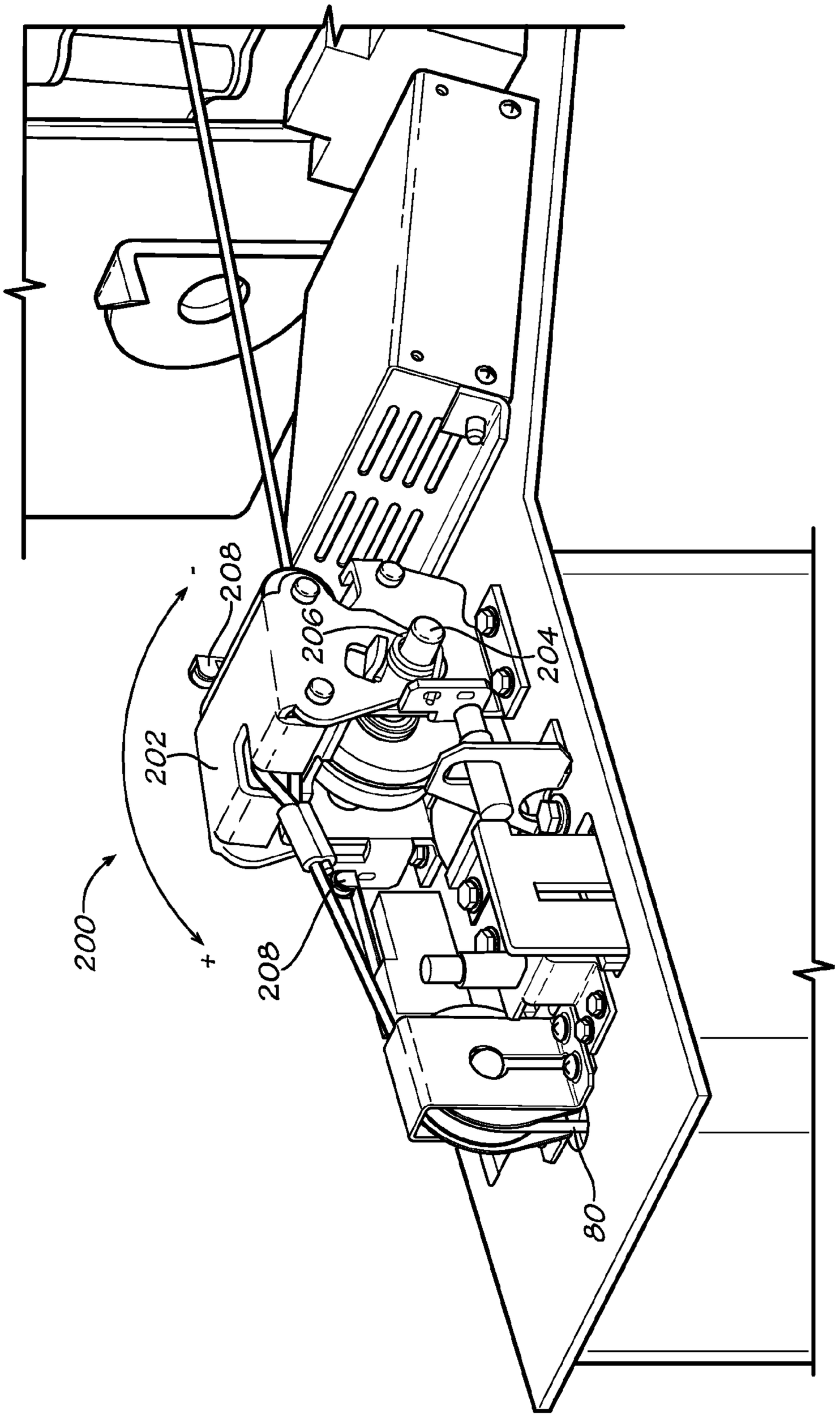

FIG. 4

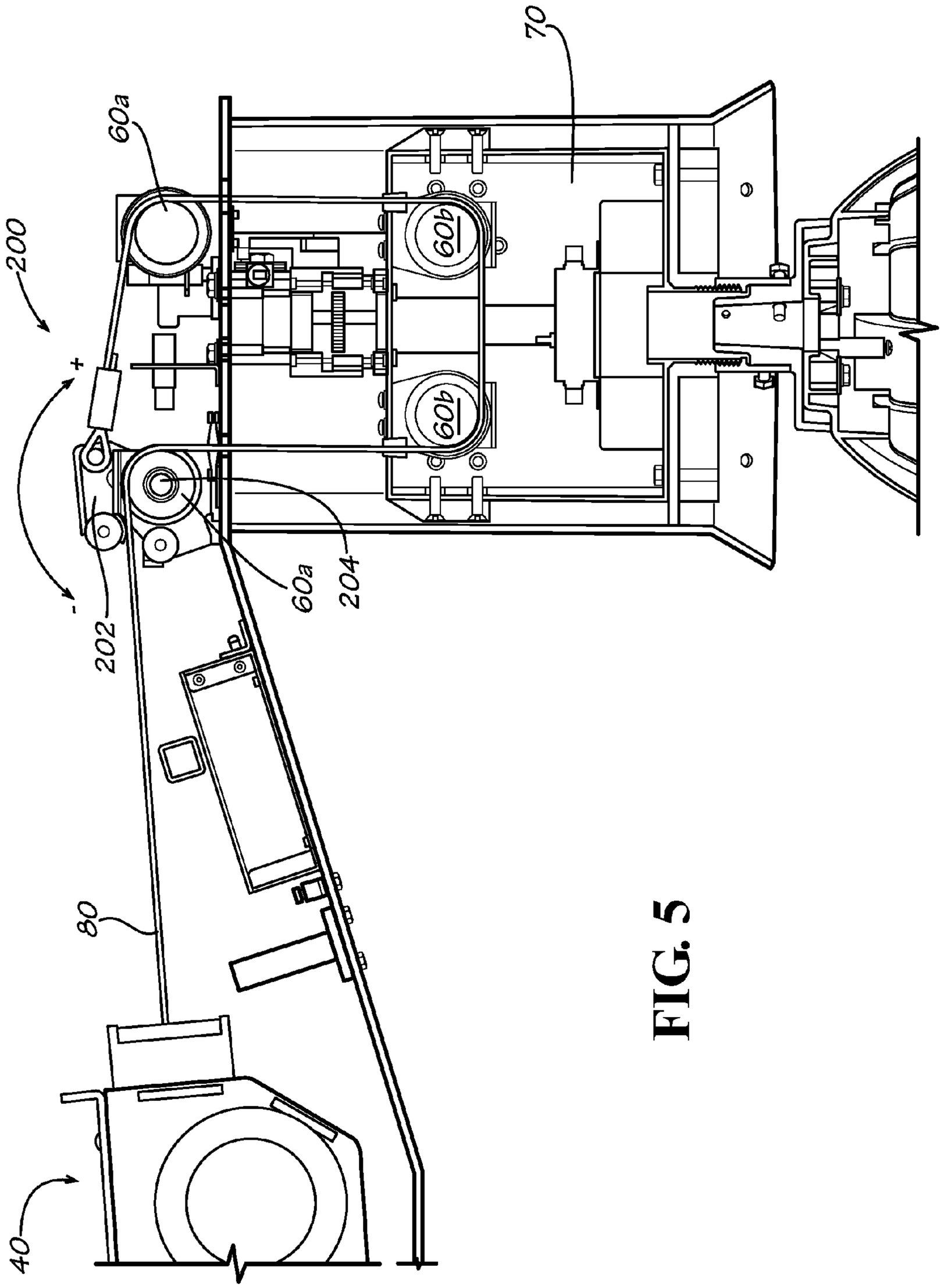

FIG. 5

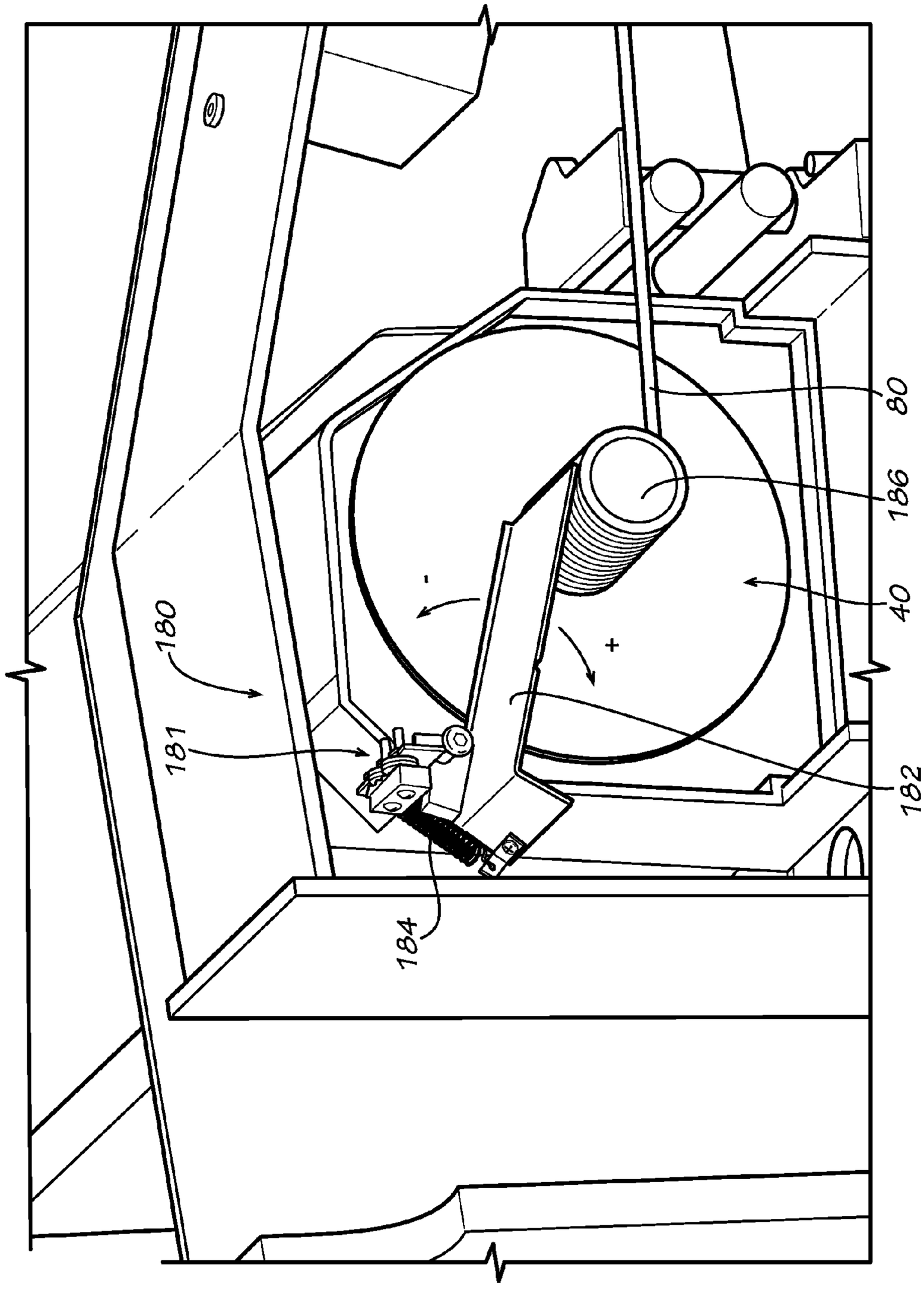

FIG. 6

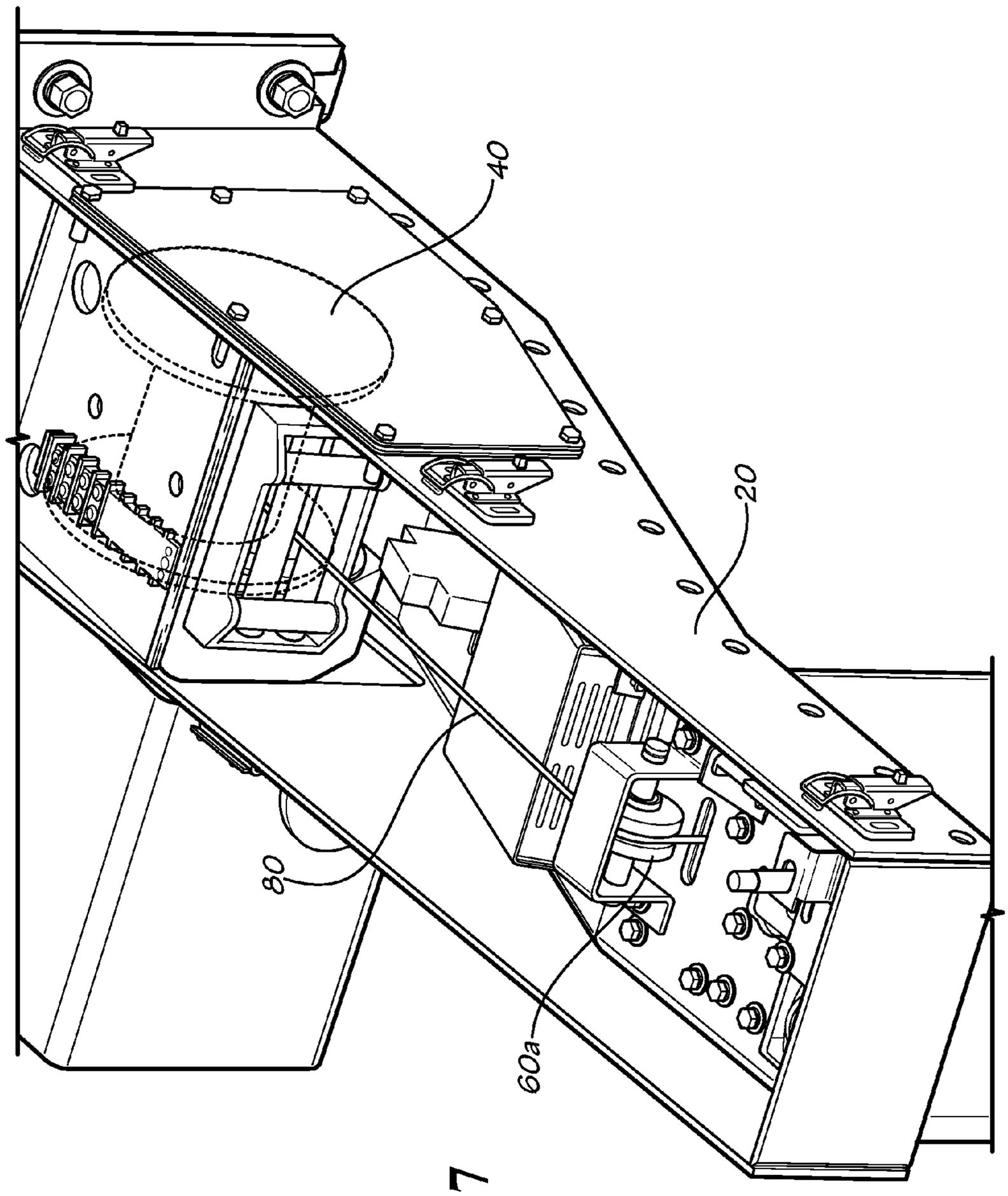

FIG. 7

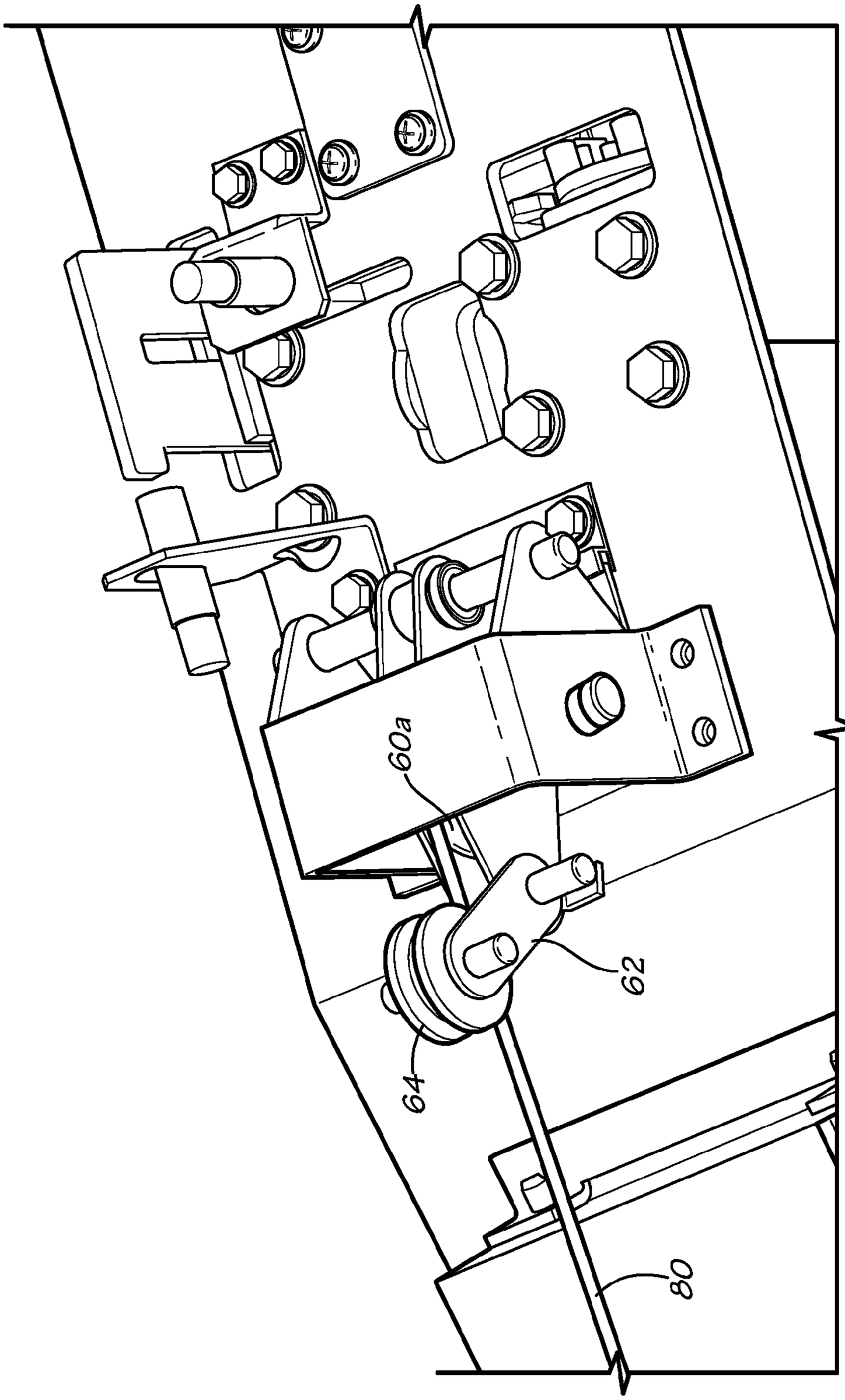

FIG. 8

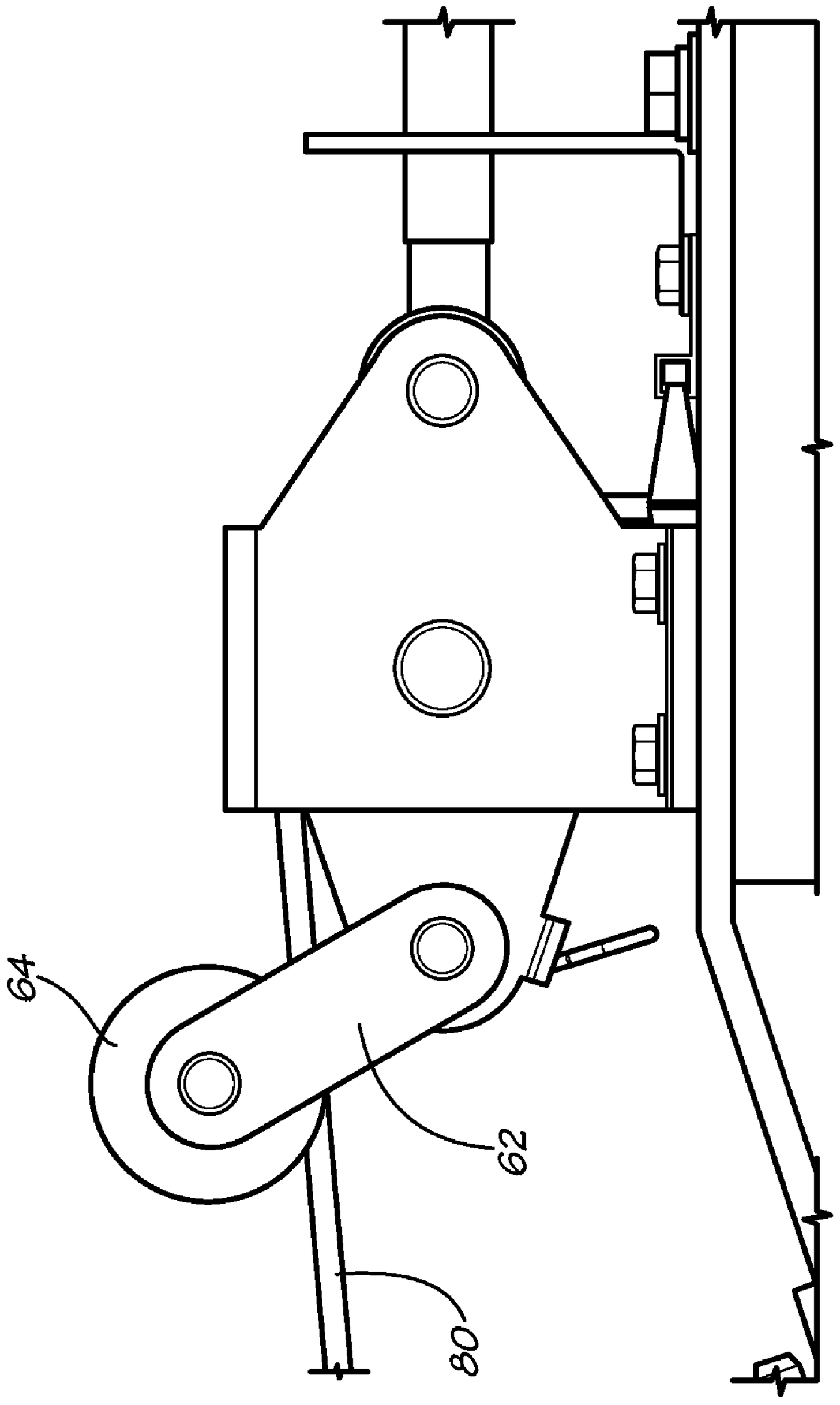

FIG. 9

ELEVATED SUPPORT SYSTEM

CROSS-REFERENCE TO RELATED APPLICATION

This application claims priority benefit to U.S. Provisional Patent Application Ser. No. 61/094,305 filed Sep. 4, 2008 and U.S. Provisional Patent Application Ser. No. 61/154,463 filed Feb. 23, 2009, both of which are hereby incorporated herein by reference in their entireties.

TECHNICAL FIELD

The present invention relates generally to the field of support systems for elevated objects, and more particularly to a system for raising and lowering a surveillance camera and/or other equipment.

BACKGROUND

It is often desirable to position a surveillance camera or other equipment at an elevated height, for example to improve the field of view and/or to prevent vandalism or theft. The present invention provides an improved elevated support system for a surveillance camera or other equipment.

SUMMARY

In example embodiments, the present invention relates to an improved elevated support system for a surveillance camera or other equipment. The elevated support system of the invention allows the supported equipment to be selectively raised and lowered for service and/or to adjust the support position.

In one aspect, the present invention relates to a system for raising and lowering equipment. The system preferably includes a fixed support arm for attachment to an elevated support structure, a movable carriage for carrying the equipment, a cable extending between the fixed support arm and the movable carriage, and a winch for selectively spooling and unspooling the cable to raise and lower the movable carriage relative to the fixed support arm.

In another aspect, the present invention relates to an elevated support mechanism including an upper support member; a carriage movable between a raised position adjacent the upper support member, and a lowered position beneath the upper support member; a lifting system for raising and lowering the carriage; and a locking mechanism for securing the carriage in the raised position.

In another aspect, the present invention relates to an elevated support system for a surveillance camera. The support system preferably includes a support arm having a winch mounted thereto for raising and lowering the surveillance camera, a first upper pulley, an upper electrical contact, and an upper alignment guide member. The support system preferably also includes a carriage for mounting the surveillance camera to, and having at least one lower pulley, a lower electrical contact for cooperative engagement and disengagement with the upper electrical contact of the support arm, and a lower alignment guide member for cooperative engagement and disengagement with the upper alignment guide member. The support system preferably also includes a cable having a first end spooled onto the winch, extending over the first upper pulley, downward and around the at least one lower pulley, and back up to a second end affixed to the support arm.

These and other aspects and features of the invention will be understood with reference to the drawing figures and detailed description herein, and will be realized by means of the various elements and combinations particularly pointed out in the appended claims. It is to be understood that both the foregoing general description and the following brief description of the drawings and detailed description are exemplary of depicted embodiments, and are not restrictive of the invention as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. **1***a* and **1***b* are cross-sectional side elevation views of an elevated support system according to an example form of the present invention, with the supported object being in a lowered and raised position, respectively.

FIG. **2** shows a perspective view of the elevated support system of FIGS. **1***a* and **1***b*, with the support object being in an intermediate position.

FIGS. **3***a* and **3***b* are detailed views of the alignment and locking mechanisms of the elevated support system according to an example form of the present invention.

FIG. **4** is a perspective view of an overload/unspooling shutoff mechanism portion of the elevated support system of FIGS. **1***a* and **1***b*.

FIG. **5** is a detailed side cross-sectional view of the elevated support system of FIGS. **1***a* and **1***b*.

FIG. **6** shows a cutaway perspective view of an optional end-of-spool sensor shutoff mechanism, according to an example form of the invention.

FIG. **7** shows a cutaway perspective view of an alternative upper pulley arrangement of an elevated support system according to an example form of the present invention.

FIG. **8** shows a perspective view of an alternative upper pulley arrangement including a cable tensioning arm, according to an example form of the present invention.

FIG. **9** shows a detailed side view of the upper pulley arrangement shown in FIG. **8**.

DETAILED DESCRIPTION OF EXAMPLE EMBODIMENTS

The present invention may be understood more readily by reference to the following detailed description of the invention taken in connection with the accompanying drawing figures, which form a part of this disclosure. It is to be understood that this invention is not limited to the specific devices, methods, conditions or parameters described and/or shown herein, and that the terminology used herein is for the purpose of describing particular embodiments by way of example only and is not intended to be limiting of the claimed invention. Any and all patents and other publications identified in this specification are incorporated by reference as though fully set forth herein.

Also, as used in the specification including the appended claims, the singular forms "a," "an," and "the" include the plural, and reference to a particular numerical value includes at least that particular value, unless the context clearly dictates otherwise. Ranges may be expressed herein as from "about" or "approximately" one particular value and/or to "about" or "approximately" another particular value. When such a range is expressed, another embodiment includes from the one particular value and/or to the other particular value. Similarly, when values are expressed as approximations, by use of the antecedent "about," it will be understood that the particular value forms another embodiment.

With reference now to the drawing figures, wherein like reference numbers represent corresponding parts throughout the several views, FIGS. **1***a*,**1***b*, and **2** show an elevated sys-

tem **10** for raising, lowering and supporting a surveillance camera or other equipment according to an example form of the invention. In the depicted embodiment, a surveillance camera dome housing **12** houses a camera for capturing images for remote observation and/or recording. The camera or other equipment can be selectively raised and supported in an elevated position to provide a better field of view and prevent tampering or vandalism, or lowered for maintenance. The system **10** generally comprises an elevated arm body **20** mounted by brackets, welding, connectors, couplings or other attachment means to the top, side or other portion of a pole **22**, or to a building, wall, tower, framing or other elevated support structure.

The arm body **20** preferably encases electronic controller circuitry, power circuitry, power and video connectivity, and other components for transmitting video signals from the camera to a remote viewing and/or recording station, and for delivering power from a remote power source to the camera, associated lighting source(s), and/or the lift equipment. The lift equipment preferably comprises a centering and connecting mechanism **30**, a winch **40**, a sprocket and latch locking mechanism **50** and a pulley system **60** that supports a movable carriage or junction box **70** to which the camera housing **12** can be secured. The winch **40** preferably comprises an electric motor, optional gearing, and a spool or drum for winding and unwinding the cable or wire **80** used to raise and lower the camera housing **12** and junction box **70**. The pulley system **60** preferably includes at least one upper pulley **60***a* (two are depicted) rotationally mounted to the arm body **20**, and at least one lower pulley **60***b* (two are depicted) rotationally mounted to the junction box **70**.

The system **10** can be activated either manually or automatically. In the automatic/remote version, a control unit is deployed at or near the base of the pole or mounting structure, or at a remote control station, to control the powered winch activity. In the manual version, a manual winch such as a pulley and crank arm mechanism are used in lieu of the powered winch. The junction box **70** preferably has the capacity to house one or more optional weights **90** to ensure appropriate disengagement of the junction box connectors from the centering and connecting mechanism **30**. A weather seal **110** is preferably deployed at the base of the junction box **70** to ensure environmental protection of the electronic circuitry during operation. One or more sealed access doors **120** are preferably provided to allow for maintenance access to different parts of the system.

In an example mode of operation, in the top or raised position, as seen in FIG. **1***b*, the latching mechanism **50** locks the junction box **70** in place, to release any tension loading on the system cable **80**. In this position, the power and video connection is fully engaged, by coupling of upper electrical contacts **130** in the arm body **20** with lower electrical contacts **132** on the junction box **70**, allowing for the proper operation of the security monitoring device mounted in the housing **12**. To lower the junction box **70**, actuation of a "down" button on the remote device initiates a slight upward motion of the junction box that—deploying a sprocket or ratchet latch system of the locking mechanism **50**—disengages and retracts a locking bar or pawl. It then initiates the unwinding of the cable **80** off a spool on the winch **40**, lowering the security housing **12** to a lowered position, as seen in FIG. **1***a*, at a level controlled by the operator. The cable **80** preferably comprises a continuous length of cable routed around the pulley system **60** in a loop to define a dual path (i.e., two segments **80***a*, **80***b* of the cable being spaced a distance from one another). This dual path cabling arrangement reduces swaying of the housing **12** and allows for the system to stabilize during the lowering and raising activities and also reduces the possibility of having the system collide with the structure it is mounted to. The cable loop extends from a first end attached and spooled onto the winch **40**, generally horizontally across through the arm body **20** and over a proximal upper pulley **60***a* in the arm body, then downward and around a proximal lower pulley **60***b* and a distal lower pulley **60***b* (alternatively a single lower pulley can be utilized) on the junction box **70**, then back up to the arm body, and optionally over a distal upper pulley **60***a* to a second end affixed to an overload/unspooling mechanism (described below) or otherwise affixed to the arm body. In alternate embodiments, a single cable path is provided, having a first end of the cable spooled onto the winch **40**, a medial segment of the cable passing over a pulley in the upper arm body **20**, and a second end of the cable affixed to the junction box **70**.

To raise the junction box **70**, the "up" button on the remote activates the winch **40** in an opposite direction to retract the cable **80**, raising the assembly of the junction box **70** and housing **12**. At the top, the centering pins **71** of the centering and connecting mechanism **30** position the junction box **70**, engaging contacts **130**, **132** of the power and video connection, and a dual sensing and locking action preferably secures the junction box in its raised position. The electrical connection for delivering power and/or video signals to and from the surveillance camera or other supported equipment is made between the one or more upper electrical contacts **130** positioned on a lower face of a carrier or other portion of the support arm body which cooperatively couples with the one or more lower electrical contacts **132** on an upper face of the carriage; and the lower electrical contacts are in turn connected to input and/or output connections of the surveillance camera or other supported equipment mounted to the carriage. An optional LED on the remote unit indicates to the operator that the system is in position and secured. Because the video signal transmission and electrical power transmission cabling and equipment are maintained stationary in the arm body, and are not raised and lowered with the camera housing **12**, the potential for tangling with the lift cables is eliminated.

The system **10** preferably comprises cooperating housing alignment components on the arm body **20** and on the junction box **70**. For example, the inside periphery of the downward facing receiver of the arm body **20** preferably comprises one or more inwardly tapering wall portions **140** for guiding one or more cooperating tapered outer contact faces **142** about the outside periphery of the junction box **70** into alignment as the housing **12** moves into the raised position. The system also preferably comprises at least one sway plate **141**. The sway plate(s) **141** is/are attached to the wall portions **140** and extend downward at an angle therefrom, helping to center the carriage **70** and prevent any swinging of the carriage **70** as it is raised into arm body **20**. The contacts **130**, **132** optionally also comprise one or more alignment guides for ensuring proper electrical contact.

The centering and connecting mechanism **30** and the latch locking mechanism **50** are shown in greater detail in FIGS. **3***a* and **3***b*. The latch mechanism **50** is affixed by bolts, welding or other attachment means to the arm body **20** at the top of the pole **22**, and the alignment pins **71** of the centering mechanism **30** extend downwardly therefrom. The latch mechanism **50** includes a transversely sliding locking plate **52** that engages within a slot in a locking arm **72** extending from the carriage **70** to hold the carriage at its raised position. A retraction spring **53** normally biases the locking plate **52** away from engagement with the carriage locking arm **72**, as shown in FIG. **3***a*. An oblong or elliptical cam **54** advances the locking

plate **52** into engagement with the carriage locking arm **72**, overcoming the spring bias, when actuated, as shown in FIG. **3***b*.

The cam **54** is rotationally actuated by rotation of an indexing wheel **55** affixed to the cam by a pawl **56** that is pivotally mounted to a carrier **57** that is slidably carried on the alignment pins **71** of the centering mechanism. In relation to the views represented in FIGS. **3***a* and **3***b*, the pawl **56** is free to partially rotate in a clockwise direction, while being blocked from rotating in a counter-clockwise direction, thereby acting as a ratchet to turn the indexing wheel **55** in one direction (counterclockwise) only. The pawl **56** engages one of four actuator pins on the indexing wheel **55** to advance the actuating wheel, and thus the cam **54**, by sequential 90° increments with each actuation. As the carriage **70** is lifted into its raised position by the winch **40** reeling in the cable **80**, the carriage contacts the carrier **57**, lifting it against the bias of one or more return springs engaged between the carrier and the latch mechanism **50**. As the carriage is driven upwards, the pawl **56** rotates the indexing wheel **55** and the cam **54** by 90°. Rotation of one of two diametrically opposed lobes of the cam **54** into abutment with the locking plate **52** advances the locking plate transversely (generally perpendicular to the raising and lowering of the carriage) through the slot in the carriage locking arm **72**. Upon release of tension on the cable **80**, the engagement of the locking plate **52** in the slot of the carriage locking arm holds the carriage **70** in its raised position (FIG. **3***b*).

To lower the carriage **70**, the winch **40** is actuated to retract the cable **80** and raise the carriage **70** slightly, which in turn contacts and lifts the carrier **57**, causing the pawl **56** to engage one of the pins on the indexing wheel **55** and rotate the indexing wheel and cam **54** by another 90° increment, allowing the retraction spring **53** to retract the locking plate **52** from the slot of the carriage locking arm **72**. This releases the carriage **70** and allows it to be lowered (FIG. **3***a*). The return springs on the alignment pins, between the carrier **57** and the latch mechanism **50**, then push the carriage downwardly, disconnecting the electrical contacts **130**, **132** as the winch **40** reels out cable **80** to lower the carriage **70**. Since the pawl **56** is free to rotate in the clockwise direction (in the reference frame of FIGS. **3***a* and **3***b*), it toggles and does not rotate the pins on the indexing wheel **55** as the carriage **70** is lowered. The slot in the carriage locking arm **72** is preferably slightly longer, for example about 1" longer, than the height of the locking plate **52** to allow the carriage to be raised a distance sufficient to cause the pawl **56** to actuate the indexing wheel **55**.

The system **10** optionally also comprises one or more position and/or load sensors, and/or electronic and/or software implemented control systems. For example, a locking plate position sensor **160** senses the presence or absence of a projection or indicator portion **162**, shown in FIG. **3***a* but hidden in FIG. **3***b*, of the locking plate **52** to identify the position of the locking plate **52** as either locked (engaged), as shown in FIG. **3***b*, or unlocked (disengaged), as shown in FIG. **3***a*. At least one locking arm up-down position sensor **170** (two are shown) similarly senses the presence or absence of a projection or indicator portion **172** of the carriage locking arm **72** to indicate when the carriage has been raised to its topmost position. An end-of-cable sensor is optionally provided in the winch compartment to prevent the cable from running off the spool and dropping the junction box (as described in further detail below). The sensors preferably communicate signals via wired or wireless connection to a processor, such as a remote or onboard microprocessor or computer programmed with software code for implementing the operation of the system.

For example, when the user pushes an "up" button or otherwise actuates the device to raise the carriage **70** and camera or other equipment mounted thereto, the winch **40** is actuated by a controller to reel in cable **80**, thereby raising the carriage toward the arm body **20**. As the carriage **70** reaches the raised position, the alignment pins guide the carriage into position to connect the electrical contacts **130**, **132**. The carriage **70** lifts the carrier **57** of the locking mechanism **50**, causing the pawl **56** to engage the indexing wheel **55** and rotate the cam **54**, thereby engaging the locking plate **52** into the slot of the carriage locking arm **72**. The locking arm up-down position sensor **170** senses the presence of the indicator portion **172** of the carriage locking arm **72**, to signal that the carriage has been raised to its uppermost position, causing the winch controller to stop the winch. The locking plate position sensor **160** confirms that the locking plate is engaged, whereupon the winch **40** is briefly reversed to allow the carriage to lower slightly into a raised resting position until its weight is borne by the locking mechanism and tension on the cable **80** is released. The positioning of the carriage at this stage can be controlled by a position sensor, a load sensor, or by timing of the duration of the reverse operation of the winch. The carriage is thereby secured in the raised position for normal operation.

To lower the carriage and associated equipment for service or inspection, the user pushes a "down" button or otherwise actuates the device to lower the carriage **70**. Initially, the winch controller reels in the cable to raise the carriage slightly, lifting the carrier **57** of the locking mechanism **50**, and causing the pawl **56** to engage the indexing wheel **55** and rotate the cam **54**, thereby disengaging the locking plate **52** from the slot of the carriage locking arm **72**. The locking arm up-down position sensor **170** senses the presence of the indicator portion **172** of the carriage locking arm **72**, to signal that the carriage has been raised to its uppermost position, causing the winch controller to stop the winch. The locking plate position sensor **160** confirms that the locking plate is now disengaged, whereupon the winch **40** is reversed to reel out the cable and lower the carriage back down to its lowered position.

As shown in FIG. **6**, an end-of-spool sensor mechanism **180** is optionally provided with the winch **40**. The end-of-spool sensor mechanism **180** includes a pivotally mounted arm **182** biased by a spring **184** into contact with the outer periphery of the cable **80** coiled on a spool **186** of the winch **40**. As the spool **186** unwinds cable during lowering of the camera housing, the diameter of the outer periphery of the cable coil decreases, allowing the free end of the arm **182** to pivot in a first direction toward the core of the spool **186** (indicated as "+" in the figure); whereas when the winch takes the cable back up during raising of the camera housing, the diameter of the outer periphery of the cable coil increases, forcing the arm **182** to pivot against the bias of the spring **184** in a second direction away from the core of the spool **186** (indicated as "–" in the figure). One or more contacts positioned on the pivoting arm actuate a switch or sensor **181** as the cable is almost entirely unwound, shutting off the winch to prevent unwinding the cable entirely off of the spool. The sensor mechanism **181** ensures that the cable **80**, which wraps around the spool **186**, does not entirely run off the spool **186**, which could cause the carriage/camera housing assembly **70** to fall to the ground.

FIGS. **4** and **5** show an overload/unspooling mechanism **200** that is optionally provided on the system of the present

invention. The overload/unspooling mechanism **200** may serve one or both of two functions: first, to prevent overloading and damaging the winch motor in the event the camera housing becomes entangled with other objects during raising; and/or second, to prevent unspooling and tangling of the cable if the camera housing is stopped or lifted during lowering. The overload/unspooling mechanism **200** comprises a bracket **202** pivotally mounted about an axle **204** (optionally the same axle that the upper pulley **60***a* is rotationally mounted on), one or more torsion spring(s) **206** for retaining the bracket in position during operation and setting the overload/unspooling force that triggers shutdown, and one or more sensors or switches **208** for controlling the operation of the winch motor in response to the pivotal position of the bracket. The distal end of the cable **80** is affixed to the bracket **202**, with the proximal end of the cable spooled on the winch, and the intermediate portion of the cable traversing the lower pulleys **60***b* and the upper pulleys **60***a* to raise and lower the camera housing as the winch spools and unspools the cable.

The spring stiffness of the torsion spring(s) **206** of the overload/unspooling mechanism **200** is/are selected to effectively counterbalance the weight of the camera housing and junction box, as well as any other equipment intended to be raised and lowered with the camera housing, to retain the bracket **202** in a neutral position (as shown in the figures). In the event too much force (i.e., greater than the anticipated maximum force) is applied to the cable **80** during raising or lowering (indicating the camera housing may have snagged on an obstruction during raising or something unintended is hanging on the camera housing during lowering), that force will overcome the bias of the retaining spring(s), causing the bracket **202** to pivot in a first direction (indicated as "+" in the figures), and actuating a sensor or switch **208** to shut down the winch motor to prevent overload damage to the winch motor and/or structural damage to the arm body, cable, or other components. In the event that less than the anticipated minimum force is applied to the cable **80** during raising or lowering (indicating the camera housing may have snagged on an obstruction during lowering, or is being lifted by a worker), the force applied by the torsion spring(s) **206** will overcome the force applied by the cable **80**, causing the bracket **202** to pivot in an opposite second direction (indicated as "−" in the figures), also actuating a sensor or switch **208** to shut down the winch motor to prevent loose unspooling and potential tangling of the cable.

In an alternative embodiment, the upper pulley **60***a* is translationally mounted to slide back and forth on an axle, transverse to the length of the cable, as shown in FIG. **7**, such that the pulley can slide freely from side to side as the cable **80** is wound and unwound to better align with the position of the cable on the spool of the winch and reduce twisting stresses or wear in the pulley and mounting bracket. In this embodiment, a single continuous length of cable or wire **80** extends from a first end connected to the winch **40**, with a medial portion running over the upper pulley and through the lower pulleys, to a second end affixed to the arm body **20**. In alternate forms of the invention, two or more cables or wires are provided. Optionally the upper pulley **60***a* can be pivotally mounted on a swivel coupling, allowing the pulley to remain aligned with the cable as it moves from side to side when it is wound onto and unwound from the reel of the winch, thereby reducing strain on the equipment. Optionally, a tensioning arm **62** having an idler pulley **64** is provided between the winch **40** and the upper pulley **60***a*, as seen in example form in FIGS. **8-9**, to maintain a steady tension on the cable and reduce or eliminate loose windings and/or cable tangling on the winch spool.

While the invention has been described with reference to certain depicted and example embodiments, it will be understood by those skilled in the art that a variety of modifications, additions and deletions are within the scope of the invention, as defined by the following claims.

What is claimed is:

1. A system for raising and lowering equipment, said system comprising:

a fixed support arm for attachment to an elevated support structure, a movable carriage for carrying the equipment, a cable extending between the fixed support arm and the movable carriage, a winch for selectively spooling and unspoolinq the cable to raise and lower the movable carriage relative to the fixed support arm, first electrical contacts mounted to the support arm and second electrical contacts mounted to the carriage, the first and second electrical contacts engaging with one another to allow operation of the equipment when the carriage moves into a raised position, and releasing from one another as the carriage moves from the raised position toward a lowered position.

2. The system of claim **1**, wherein the equipment comprises a surveillance camera housing mounted to the movable carriage.

3. The system of claim **1**, further comprising a pulley system for carrying the cable.

4. The system of claim **3**, wherein the pulley system comprises at least one upper pulley mounted to the support arm and at least one lower pulley mounted to the carriage.

5. The system of claim **1**, wherein the winch is a powered winch, and further comprising a control station for remotely operating the powered winch.

6. A system for raising and lowering equipment, said system comprising:

a fixed support arm for attachment to an elevated support structure, a movable carriage for carrying the equipment, a cable extending between the fixed support arm and the movable carriage, a winch for selectively spooling and unspoolinq the cable to raise and lower the movable carriage relative to the fixed support arm, wherein the cable is spooled over a pulley system to define a dual cable path comprising two cable segments spaced a horizontal distance from one another, wherein the pulley system comprises an upper pulley that is pivotally mounted to the support arm.

7. A system for raising and lowering equipment, said system comprising:

a fixed support arm for attachment to an elevated support structure, a movable carriage for carrying the equipment, a cable extending between the fixed support arm and the movable carriage, a winch for selectively spooling and unspooling the cable to raise and lower the movable carriage relative to the fixed support arm, wherein the cable is spooled over a pulley system to define a dual cable path comprising two cable segments spaced a horizontal distance from one another, wherein the pulley system comprises an upper pulley that is translationally mounted to slide back and forth on an axle.

8. A system for raising and lowering equipment, said system comprising:

a fixed support arm for attachment to an elevated support structure, a movable carriage for carrying the equipment, a cable extending between the fixed support arm and the movable carriage, a winch for selectively spooling and unspooling the cable to raise and lower the movable carriage relative to the fixed support arm, an

end-of-spool sensor mechanism comprising a pivotally mounted arm operatively engaged with the cable spooled on the winch, and an actuator for shutting down the winch when the pivotally mounted arm moves into a position indicating nearly all of the cable has unspooled from the winch.

9. The system of claim **8**, further comprising an overload/unspooling mechanism, the overload/unspooling mechanism comprising a pivotally mounted member, wherein the cable is connected to the pivotally mounted member and causes the pivotally mounted member to pivot in a first direction when overloaded, to shut down the winch.

10. The system of claim **9**, wherein the pivotally mounted member pivots in a second direction when under-loaded, to shut down the winch.

11. An elevated support mechanism comprising a carriage, a winch, a cable coupled to the carriage and the winch, and an end-of-spool shut-off mechanism for deactivating the winch when nearly all of the cable is unspooled from the winch.

12. An elevated support system for a surveillance camera, comprising:

a support arm having a winch mounted thereto for raising and lowering the surveillance camera, a first upper pulley, an upper electrical contact, and an upper alignment guide member;

a carriage for mounting the surveillance camera to, and comprising at least one lower pulley, a lower electrical contact for cooperative engagement and disengagement with the upper electrical contact of the support arm, and a lower alignment guide member for cooperative engagement and disengagement with the upper alignment guide member;

a cable having a first end spooled onto the winch, extending over the first upper pulley, downward and around the at least one lower pulley, and back up to a second end affixed to the support arm.

13. The elevated support system of claim **12**, further comprising a second upper pulley mounted to the support arm, and wherein the cable passes from the at least one lower pulley, over the second upper pulley, to the second end affixed to the support arm.

14. The elevated support system of claim **13**, wherein the second end of the cable is affixed to a bracket pivotally mounted to the support arm, and wherein movement of the pivotal bracket away from a neutral position deactivates the winch.

15. The elevated support system of claim **12**, further comprising a latch mechanism for securing and releasing the carriage to and from the support arm at an elevated position.

16. The elevated support system of claim **15**, wherein the latch mechanism comprises a carriage locking arm attached to the carriage and having an opening therethrough, and further comprises a locking member mounted to the support arm and sliding into and out of engagement with the opening in the carriage locking arm.

17. The elevated support system of claim **16**, wherein the latch mechanism further comprises a cam for advancing and retracting the locking member and a pawl for actuating the cam.

18. The elevated support system of claim **12**, further comprising an end-of-spool sensor mechanism for deactivating the winch before the cable completely unspools therefrom.

19. The elevated support system of claim **12**, further comprising a surveillance camera mounted to the carriage and electrically connected to the lower electrical contact.

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